REMARKS

*Status of claims*

Applicants thank the Examiner for the consideration given to the present application. Claims 1 and 10 have been amended. New claim 15 has been added. Support for the amendments and new claims is found in the specification and figures, and thus no new matter has been entered in the claims. Claims 7 and 11 are canceled without prejudice. Claims 1-6, 8-10, and 12-15 are pending in the present application.

*Rejection of Claim 1-3, 5, and 8 under 35 U.S.C. §103*

Claims 1-3, 5, and 8 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, U.S. Patent No. 6,241,893 B1 in view of Derbyshire et al., U.S. Patent No. 6,057,262 and Hou et al., U.S. Patent No. 6,565,749 B1. Claim 10 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Beauman et al., U.S. Patent No. 4,396,512 in view of Derbyshire et al. Claims 4, 6-7, and 14 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Levy in view of Derbyshire et al. and Hou as applied to claim 1 above, and further in view of Beauman et al., U.S. Patent No. 4,396,512. Claim 9 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Levy in view of Derbyshire et al. and Hou as applied to claim 1 above, and further in view of Denkewicz, Jr. et al., U.S. Patent No. 5,772,896. Claim 12 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Levy in view of Derbyshire et al. and Hou as applied to claim 1 above, and further in view of Tremblay et al., U.S. Patent No. 6,660,166 B2. Claims 11 and 13 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Beauman et al. in view of Derbyshire et al. as applied to claim 10 above, and further in view of Tremblay et al.

Applicants respectfully traverse the rejection of the claims and submit that the Examiner has not met the burden of establishing a prima facie case of obviousness under §103. MPEP §2145. In order to establish a prima facie case of obviousness under §103, the Examiner has the burden of showing, by reasoning or evidence, that: 1) there is some suggestion or motivation, either in the references themselves or in the knowledge available in the art, to modify that reference's teachings; 2) there is a reasonable expectation on the part of one of ordinary skill in

the art that the modification or combination has a reasonable expectation of success; and 3) the prior art references (or references when combined) teach or suggest all the claim limitations. MPEP §2145.

Applicants respectfully submit that none of the references (Levy, Beauman et al., Derbyshire et al., Hou, Tremblay et al., or Denkewicz, Jr. et al.) teach or suggest all of the limitations of Applicants' independent claims 1, 10, and 15. Applicants' independent claims 1 and 10 recite a filter for providing potable water comprising, *inter alia*, a filter material formed in part from a plurality of mesoporous activated carbon filter particles and mesoporous activated carbon filter particles coated with a cationic polymer, wherein the filter has a F-BLR of greater than about 2 logs and a F-VLR of greater than about 1 log. Applicants' new independent claim 15 recites a filter for providing potable water comprising, *inter alia*, a filter material formed in part from a plurality of mesoporous activated carbon filter particles and mesoporous activated carbon filter particles coated with a cationic polymer, wherein the filter is operable to remove bacteria, viruses, or microbials from an influent passing through the filter.

The Examiner asserted that Levy teaches all the limitations of independent claim 1 except for a cationic polymer and mesoporous activated carbon. The Examiner further asserts that Hou teaches a cationic polymer bonded to the reactive surface of a filter, but not mesoporous activated carbon, and Derbyshire et al. teach mesoporous activated carbon particles for wastewater treatment. Thus, the Examiner concluded that it would have been obvious to one of ordinary skill in the art to modify Levy in view of Hou with the element of Derbyshire because it has a relatively high pore surface area for increased absorption activity while retaining a relatively high hardness and relatively low friability to be adapted to with stand regeneration. With respect to Independent claim 10, the Examiner asserted that Beauman et al. teach all the limitations of Applicants' claim 10 except for the pore size of the filter. The Examiner further asserted that Derbyshire et al. teach mesoporous activated carbon particles for wastewater treatment. Thus, the Examiner concluded that it would have been obvious to one of ordinary skill in the art to modify Beauman with the element of Derbyshire et al. because it has a relatively high pore surface area for increased absorption activity while retaining a relatively high hardness and relatively low friability to be adapted to withstand regeneration. This evidence is insufficient to meet a prima facie case of obviousness.

As set forth above, Applicants' claims 1, 10, and 15 require a filter that is formed in part from mesoporous activated carbon particles and mesoporous activated carbon particles coated with a cationic polymer. In addition, claims 1 and 10 further require the filter to have a F-BLR of greater than about 2 logs and a F-VLR of greater than about 1 log, while claim 15 requires the filter to be operable to remove bacteria, viruses, or microbials. The Examiner asserted that Levy taught all of the limitations of claim 1 except mesoporous activated carbon and a cationic polymer. The Examiner cited column 18, lines 50-53 of Levy to support the assertion that Levy teaches the removal of microorganisms with a non-mesoporous carbon filter. However, Applicants respectfully submit that this is an incorrect assertion. Rather, Levy discloses, "In addition, the absorption of gases into the zeolite gel 35 during the filtering operation tends to destroy microorganism growth within or on the structure of the media." (col. 18, lines 50-53). Levy teaches that the filter is configured to "tend" to destroy or prevent microorganism growth in or on the filter (e.g., bacteriostatic filter), but does not teach or suggest the filter removes microorganisms from the influent (i.e., the water passing through the filter). In addition, Levy teaches that the absorption of gases by the zeolite gel is what destroys the microorganism growth in or on the filter.

In sharp contrast, Applicants' claims recite a filter that removes microorganisms (bacteria, viruses, microbials, etc.) from the influent passing through the filter. Even more particularly, claims 1 and 10 recite a filter that has a specific bacteria and viruses removal value, i.e., a F-BLR of greater than about 2 logs and a F-VLR of greater than about 1 log, which is clearly not taught or suggested by the phrase "tend to destroy." In addition, Levy's filter requires gases and zeolite gel to destroy the microorganism growth, wherein Applicants' filter does not require gases or the zeolite gel to remove the microorganisms from the influent passing through the filter as recited by Applicants claims.

As acknowledge by the Examiner, the only reference to teach mesoporous activated carbon filter particles is Derbyshire et al., but only in relation to wastewater treatment (carbon particles disposed in a large basin of liquid). Derbyshire et al. is completely void of any teaching or suggestion regarding the removal of bacteria, viruses, or microbial from an influent passing through the filter or F-BLR and F-VLR values. Derbyshire et al. does not recognize mesoporous activated carbon filter or filter material as having a F-BLR of greater than about 2 logs, and a F-

VLR of greater than about 1 log and does not teach, suggest, or recognize the ability to provide potable water using such a material. Thus, Levy, Derbyshire et al., and Hou, singularly or in combination, do not teach or suggest a mesoporous activated carbon filter that is operable to remove bacteria, viruses, or microbials or that has F-BLR and F-VLR values as recited in Applicants' claims 1, 10, and 15.

In fact, not one reference, singularly or in combination, disclose or suggest a filter having a F-BLR of greater than about 2 logs and a F-VLR of greater than about 1 log as claimed by Applicants, let alone a mesoporous activated carbon filter having such values. The Examiner asserted that Beauman et al. teach a non-mesoporous filter having the claimed F-BLR and F-VLR values in compliance with EPA regulations cited in Beauman et al., but this is also an incorrect assumption. Applicants' specification defines F-BLR ("Filter Bacteria Log Removal") as

> "the bacteria removal capability of the filter after the flow of the first 2,000 filter material pore volumes. The F-BLR is defined and calculated as:
>
> F-BLR = -log [(effluent concentration of E. coli)/(influent concentration of E. coli)],
>
> wherein the 'influent concentration of E. coli' is set to about 1x108 CFU/L continuously throughout the test and the 'effluent concentration of E. coli' is measured after about 2,000 filter material pore volumes flow through the filter." (p. 7, lines 9-16).

Applicants' specification also defines F-VLR ("Filter Viruses Log Removal") as

> "the virus removal capability of the filter after the flow of the first 2,000 filter material pore volumes. The F-VLR is defined and calculated as:
>
> F-VLR = -log [(effluent concentration of MS-2)/(influent concentration of MS-2)],
>
> where the 'influent concentration of MS-2' is set to about 1x107 PFU/L continuously throughout the test and the 'effluent concentration of MS-2' is measured after about 2,000 filter material pore volumes flow through the filter." (p. 7, lines 21-28).

Contrary to the Examiner's assertion, the EPA regulations disclosed in Beauman et al. are not applicable and thus do not teach Applicants' claims 1 and 10. Applicants submit that the EPA regulations cited in Beauman et al. are concerned with bacteriostatic filter criteria (limiting Pesticides such silver), which are not the same as the removal rates of bacteria and viruses as claimed in Applicants' present invention.

Moreover, Beauman et al. teach a bacteriostatic filter that is configured, not to remove bacteria and viruses from the influent passing through the filter as recited in Applicants' claims, but to control or suppress the growth of bacteria on or in the filter during stagnant periods using silver. (See Abstract). In fact, Beauman et al. requires silver-treated cellulose fibers to control or suppress bacteria growth on or in the filter. (col. 5, lines 31-38). The claimed invention does not require silver to remove bacteria, viruses, or microbials. Thus, the EPA regulations in Beauman et al. do not disclose the F-BLR and F-VLR as recited in Applicants' claims 1 and 10 or a filter operable to remove bacteria, viruses, or microbials from the influent passing through the filter as recited in Applicants' claim 15. Therefore, none of the references applied by the Examiner, singularly or in combination, teach or suggest a mesoporous activated carbon filter that has a F-BLR of greater than about 2 logs or a F-VLR of greater than about 1 log or that is operable to remove bacteria, viruses, or microbials as required by Applicants' claims.

Notwithstanding the above arguments, Applicants respectfully submit that neither the references themselves (Levy, Derbyshire et al., Beauman et al., Hou, Tremblay et al., or Denkewicz, Jr. et al.) nor the knowledge available in the art provide any suggestion or motivation to combine Derbyshire et al. with Levy or Beauman et al. or provide one of ordinary skill in the art a reasonable expectation that the modification has any reasonable expectation of success. As admitted by the Examiner, neither Levy nor Beauman et al. teach or suggest mesoporous activated carbon or the claimed intra-particle pore size. In an attempt to resolve these deficiencies in the primary references, the Examiner asserted that it would have been obvious to modify Levy and Beauman et al. with the element of Derbyshire et al., because it is used for waste water treatment and "has a relatively high pore surface area for increased absorption activity while retaining a relatively high pore surface area." Applicants submit that just because Derbyshire et al. teach mesoporous activated carbon configured to treat waste water, it does not necessarily follow or suggest that mesoporous activated carbon is capable of removing larger particles such as microorganisms from water to provide potable water. Moreover, although Beauman et al. teach, "such an activated carbon provides a relatively high pore surface area for increased absorption activity," this does not necessitate or suggest that a mesoporous activated carbon filter can or will remove bacteria, viruses, or microbials from the influent passing through the filter, let alone provide a filter a F-BLR of greater than 2 logs or a F-

VLR of greater than 1 log as required by Applicants' claims. (col. 4, lines 48-59). This is an assumption made by the Examiner.

As stated by the Federal Circuit Court in *In re Fine*, "Whether a particular combination might be 'obvious to try' is not a legitimate test of patentability." *In re Fine*, 837 F.2d 1071, 1075 (Fed. Cir. 1988) (citing *In re Geiger*, 815 F.2d 686, 688 (Fed. Cir. 1987). First, the Applicants submit that none of the references teach or suggest mesoporous activated carbon in a filter configured to remove or kill bacteria, viruses, or microbes from an influent passing through the filter or having a F-BLR or F-VLR of greater than 2 logs or 1 log, respectively. Second, Applicants submit that Derbyshire et al. may teach mesoporous activated carbons may be used to absorb large molecules such as color bodies, but Derbyshire et al. do not teach or suggest that mesoporous activated carbon may remove large particles such as bacterial, viruses, or microbials, which are different from molecules.

Applicants submit that it is and was known by one of ordinary skill in the art that large molecules range in size from approximately 1 nm to 10 nm, which is significantly smaller than the average sizes of viruses (ranging in size from approximately 25 nm to 80 nm) or bacteria (ranging in size from approximately 0.5 μm to 10 μm). For example, E. coli has an approximate size of 1 μm to 3 μm, which is 100 to 1000 times larger than the size of the mesopores (intra-particle pores of the carbon particles). Thus, one of ordinary skill in the art at the time of the invention would have understood that mesoporous activated carbon would not have intra-particle pores large enough to capture (remove) a sufficient enough amount of bacteria, viruses, or microbials as recited in claim 15, let alone having a F-BLR or F-VLR has recited in claims 1 and 10. Therefore, Applicants respectfully submit that there is insufficient motivation or suggestion in the references themselves or in the knowledge available in the art to modify Levy or Beauman et al. with the teachings of Derbyshire, and that one of ordinary skill in the art would have no reasonable expectation that such a modification would be successful.

Accordingly, Applicants respectfully request the rejection under 35 U.S.C. §103 of independent claims 1, 10, and 15 to be withdrawn. As claims 2-6, 8, 9, 12-14 depend from claims 1 or 10. Applicants respectfully request the rejection of these claims be withdrawn as well.

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## CONCLUSION

Applicants respectfully submit that the present application is in condition for allowance. The Examiner is encouraged to contact the undersigned to resolve efficiently any formal matters or to discuss any aspects of the application or of this response. Otherwise, early notification of allowable subject matter is respectfully solicited.

Respectfully submitted,
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